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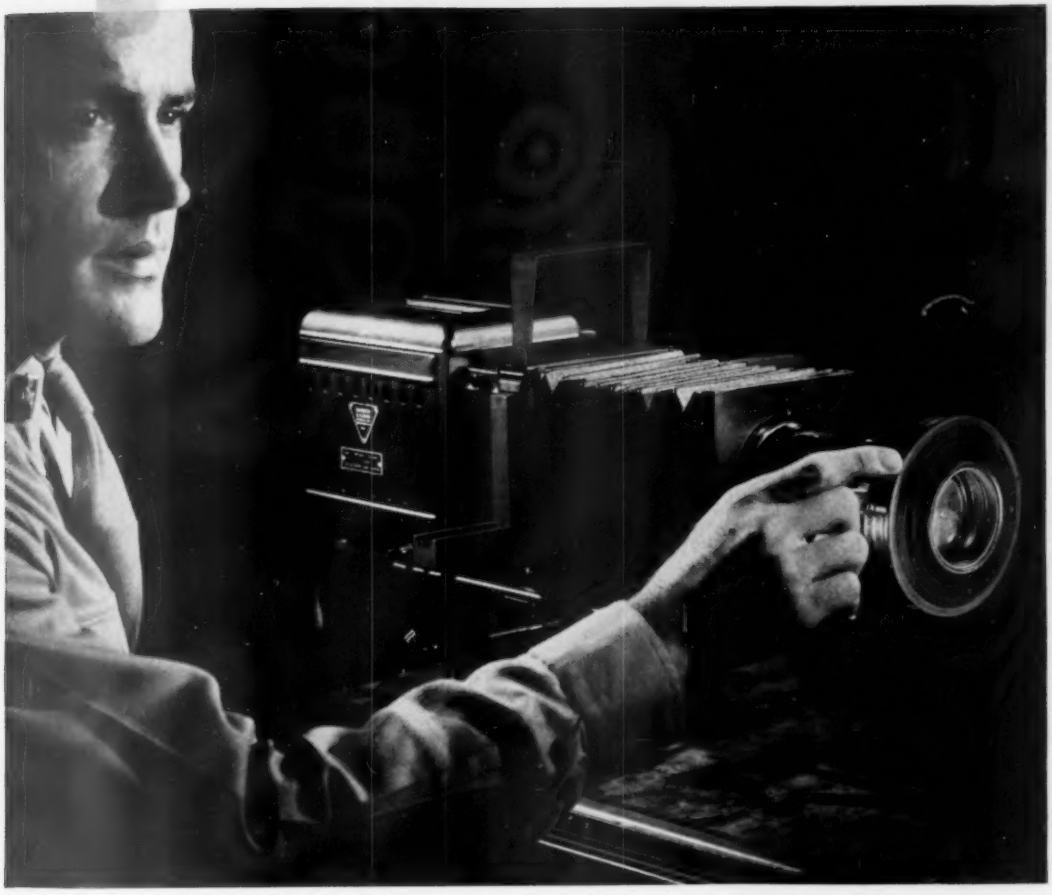

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M. A. RUSSELL, Secretary-Treasurer,
403 California Ave., Royal Oak, Mich. ☐ RENEWAL

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# THE AMERICAN BIOLOGY TEACHER

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# The American Biology Teacher

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## An Eight-Year-Old Looks At His World

LOUISE A. NEAL
2A–3B Grades, Linwood School, Wichita, Kansas

Children must learn to think. The study of science greatly widens the interests and knowledge of children and stimulates good thinking. Children have a natural interest in the study of nature and science. They note the effect, but the causes must be explained. To obtain lasting results, the study of science must be based on sound scientific principles, but it must be so simplified that a child's mind can understand.

Children have a flair for exploration into familiar fields. They are most interested in their physical comfort and social well-being. In learning about their physical environment, children want to know what things are for, where they come from, and what made them. That this inquisitive attitude continues throughout life has many times been proved to my satisfaction. Children from higher grades have often brought back to our classroom a specimen, or an experiment they have performed because of an interest that was aroused by their primary studies.

The study of science and nature is taught as a part of the major units of work. School experiences are integrated. Our task is to guide the all-round development of children rather than to teach subjects. The school today is a controlled learning environment where interest supplies the driving force; where opportunities are offered, not inflicted; where skill is acquired, not for the sake of the skill, but for its use.

The interest of the children and the questions they ask can guide us to the materials out of which an experience curriculum, rich in scientific learning, will develop. Explore the knowledge which your children possess. Lead them to make careful observations and to give accurate expression to their findings. While science is knowledge, it is to be approached by young learners as experience. Children must experience the world to know it.

The entire community lends itself to elementary science study. As children learn the interdependence of the water

plants in the aquarium, of the flowering plants and the flying insects, a realization of the interdependence of man upon man and of man unpon his environment forces itself in upon the children's consciousness and they comprehend the need of finding their places in this world and of assuming their responsibilities.

All of our projects are planned in advance and the children, therefore, work toward a definite goal. Books, magazines, pamphlets, *The Weekly Reader,* live specimens, and real science experiences are all used. The little book, *Peter and the Frog's Eye*, by Julius King, has been of invaluable aid in introducing the wonders of this everyday world. Many boys and girls have seen pictures of themselves in this small boy who was blind to the beauties of the great out-of-doors until he saw them through the eyes of the frog. But Nature is the greatest text book. Children have been inspired by these nature studies to write stories and poems; they have read many books and told others of them; on their own initiative they have continued exploration in these fields. The exploration trips have caused ears and eyes to become keenly attune to the music and other manifestations of nature. The thrill of discovery has increased the spirit of comradeship between children and teacher.

When children find a need for proof, they begin to experiment. The experiments and experiences always should be treated in such a manner that the children learn to make relationships. When we watered our plants with a jar, we discovered that the hand on the side of the jar away from us looked larger. The hand really looked bigger than it was. This was a magnifying glass. A magnifying glass is always curved; the jar is curved and that is one reason why it makes things look bigger. We looked at our skin through a magnifying glass and saw the pores. Then we looked at a butterfly's wing and found it is covered with many tiny scales. One member of the class brought a toy microscope from home and told the class, "My microscope is a delicate instrument. It shows us many things that we could not see with our eye or with a magnifying glass. It makes things much larger than they really are so that we can see them. I also have a hand lens which helps me see tiny things. It is small and easy to carry."

Every child should have the privilege of observing the life activities of plants and animals under their normal environmental conditions. Observation in the outdoors, supplemented by the raising of plants and live animals in the classroom, will give children an insight into the workings of life that could not be had otherwise. Here the aquarium and terrarium prove most interesting as they lend themselves to the study of live specimens in their environment.

Gardening encourages the children's interest in living things. Gardening makes the children, as well as the plants, grow. The children especially enjoy the planning and planting stages of gardening. While waiting for growth to begin, the children read, make studies and experiment. They read about the biggest secret in the world—the secret of how plants make food. The experiment to see if water rises in plants, if plants really need sunlight, what seeds need to germinate; they also note the effect of weather on the garden and learn to read the thermometer.

Seeds, bulbs, cacti, houseplants and vines furnish experimental material. Carrots, parsnips, turnips, and beets may be partially topped and, placed in a shallow container of water, soil or sand, they will grow and make an attractive plant for the schoolroom. Some vegetables will grow nicely if cut in half, hol-

FIG. 1. First steps into our world of science.

lowed out and hung upside down so that the hollow will hold water.

A study of birds never fails to interest children. From reading stories about birds the class learns of the habits and characteristics of birds—how they learn to fly, how they care for their eggs, etc.

Another enjoyable study is that of insects. The children note the beauty of form in the butterflies and moths, also their colors and habits. The life histories of insects and frogs are studied and, where possible, specimens illustrating each stage of the metamorphic development are obtained. The ceaseless activity of ants and bees is observed. The grasshopper's wing covers are discovered to be his fiddles and his hind legs to be the bows. The children listen to the music of the locust and the honey bee. They learn that the fly has many eyes and that "Eight Legs" the spider, who really is not an insect, spins beautiful webs.

The silkworm is fed his diet of mulberry leaves and kept in a clean box until he spins his cocoon. If the worm is allowed to live inside the cocoon, it turns into a moth. The moth eats its way out of the cocoon and spoils the silk threads that should have been made into silk cloth. Many of the cocoons are put into boiling water to kill the worms inside. The water does not harm the silk. A few of the silkworms are allowed to turn into moths, because these moths lay the eggs that hatch the next generation of silkworms. The eggs laid are put into a fruit jar and placed in the electric refrigerator so that they will not develop until spring when mulberry leaves will be ready for their nourishment.

Pets are extremely interesting and necessary to most children. They bring them to school, it not being "against the rule" as was the case in Mary's schooldays, and here they study the habits of their pets and assume responsibility for their care. We have studied rabbits, turtles, chickens, canaries, garter snakes, bees and many others.

Many adjustments are made as chil-

dren learn to work together. Committees are formed to take care of the varied interests and as these groups carry on their research activities, the children become more and more considerate of the rights of others; in other words, they learn to be members of a group, to criticize and to take criticism. The habit of sharing information is definitely formed. For example, during a science discussion lesson, one child remarked that a kangaroo had a pocket for the carrying and feeding of its young. Many of the children wondered about this marvel and began searching for information and pictures, since it was not feasible to see a real kangaroo. Soon they found a picture of a kangaroo and a description of its unique method of transportation, which information was shared with the other members of the class.

We review and summarize in a science and nature program, frequently by playing the *Do You Know?* game in which each child participates. The following are examples of some of the facts learned:

Do you know that spiders are useful, catching flies and mosquitoes?

Do you know when the spider spins her web she puts sticky bubbles on some of the threads to catch her dinner? She dosen't get caught on the web herself because she knows which threads are the sticky ones.

Do you know that some spiders can spin little parachutes and sail about on them?

Do you know that Old Mother Nature has a band? The little black cricket and the grasshopper play on their fiddles. The katydid plays on his wing fiddles too. The frogs have a chorus and the bees hum a busy tune.

Do you know that the wooly bear caterpillar sleeps all winter like the real bear?

Do you know that some butterflies go South where it is warm in the winter, just like the birds? Not all of them go South, just as not all of the birds go. Some of the butterflies are sleeping in cracks under the bark of the trees. Some butterflies are caterpillars and they sleep all winter until spring.

A final summary, which we found to be most profitable and enjoyable, was an occasion when we invited the various grades in our elementary school to visit our class room. One of our children met the guests at the door and directed them to the various centers of interest. A table of our discoveries was the first exhibit. Among the objects on display, which were described by the children, were spiders, bees, comb and honey, wasps and types of nests, ants in a jar where their tunnels and storehouses were visible, earthworms, tadpoles, toads, frogs, garter snakes, a skin that had been shed while in the cage, a large water snake's skin, rabbit, fish, turtle and snails. Also on display were a bird center, many books and pictures, old birds' nests, a canary, microscope, hand lens, magnifying glass, plant cupboards, indoor garden, prepared flower pots, an experimental garden, cacti, seeds, rooted cuttings, museum, weather calendar and thermometer, butterflies, moths and other insects, trees, leaves, blueprints of leaves, magnet, compass, weathervane, and science books.

The following are some of the talks the children gave in defining terms and in describing equipment, experiments and other activities in the field of nature and science:

### An Aquarium

This is our aquarium. We have fish in it. Water plants are needed for the fish. The fish are fed every morning. Snails help to clean the aquarium. Fresh water is put in once a week. The fish enjoy swimming through the castle. It is lots of fun to watch the fish eat.

### How Water Rises in Plants

We set up an experiment to see if water rises in plants. The materials used were containers, water, food coloring, and celery. Glasses were half filled with colored water. Stems of celery were placed in the colored water. The experiment was placed in the sunlight. Soon the veins of the stems and leaves became colored. The experiment proved that water rises in plants.

FIG. 2. Two new leaves—Plants do need food for growth!

### OUR EXPERIMENTAL GARDEN

We have an experimental garden in our room. We started the plants growing when they were tiny sprouting seeds, slips and cuttings. The seeds were planted in the sand and as soon as water, air and sunlight had been given them, they began to grow. The slips and cuttings were little parts of the big plants. We put the slips in sand and in water that they might root. Before long, little white roots were growing from the slips. The slips were then ready to plant in dirt. Come and see our plants sometime.

### PLANT CUPBOARDS

People keep food in cupboards. When people want food they go to the cupboard to get it. Some plants have cupboards. Beets, turnips, carrots, and sweet potatoes are plant cupboards. You eat this kind of cupboard. As the plants grow, they put food away in their cupboards. Then the plant wants food, it takes it from the cupboard. Put a sweet potato into a bowl of water. Keep the bowl in the dark for about two weeks. When you look at the potato, you will find a little plant.

### GREENHOUSES

We took a trip to the greenhouse. We have a garden and a small greenhouse in our classroom and we wanted to see what a real one was like. On the way to the green house, we looked for signs of the season. At the greenhouse we found some lovely cut flowers. They had them in a refrigerator case. Besides the cut flowers and potted plants, they had vegetables growing right in the ground floor of the greenhouse. We saw how the top windows opened and we saw the furnace that keeps the plants warm in the winter time. There was a cat too to keep the mice from eating seeds as they were planted. The greenhouse looked like a glass castle with green everywhere.

### MUSEUM

We have a museum in our room. All of the boys and girls keep many things in it. We find articles for the museum on the way to school, in the parks, fields, woods, and in our homes. We find things wherever we look. All of us go exploring and find seeds, leaves, nuts, stones, old birds' nests and bugs. We keep the treasures we find on some shelves. The museum is interesting and helps us with our work.

### CONE TREES

There are many different kinds of cone trees. The pines have their needles arranged in bundles. Firs have flat needles which are green on top and have two white lines on their under side. Spruces have stiff sharp needles. All of the cone trees belong to one big family—the pine family or "conifers." Cones really are a kind of seed pod. Most of the pines are evergreens. This means that they do not shed their leaves. It means that

their leaves do not turn brown and fall all at one time, as the leaves of the elm or maple trees do. They fall when they are ready to die and new needles take their places.

### Roots Work for Trees

A tree has many roots. It has big roots and many little roots. The big roots keep the tree in the ground. The little roots get water from the ground. The water goes from the roots up into the tree. Water helps to make the tree big, for there is food in the water for the tree. In winter, trees go to sleep. The roots do not work. When winter is over the roots get water for the trees again. When the roots of the maple tree go to work, sugar water is pulled up into the maple tree. Men make maple sirup when the sugar maple roots go to work.

### Birds' Nests

There isn't any harm in taking old birds' nests after the little birds are grown and through with them. So we went on a nest-hunting trip. All of the children looked for nests. We found a robin's nest made of mud and grass, and an oriole's nest that was like a soft swing. The different birds make as many different kinds of nests as people do houses.

### Specimens of Insects

The specimens we have of insects were killed with gasoline. One drop of gasoline on the head of the insect kills it instantly without any struggle. The gasoline soon evaporates and leaves the insect in perfect condition.

### Animals Find Winter Homes

Animals know winter is coming. Many of them grow warm winter coats; others find new homes for winter. Bears eat and eat when winter is coming. They then sleep all winter. Sleeping all winter is known as hibernating. Squirrels and raccoons have homes in trees. Mice and chipmunks live in the ground where they have found holes and stored their food for the winter. Many of the birds fly away for the winter. They find homes down in the South. Other birds stay here all winter and they are the ones we must remember to feed this winter.

# Feeding Plants

HELEN FIELD WATSON
Senior High School, Mitchell, South Dakota

For four years students in our high school biology classes have been interested in experiments with plant foods. The first year a few students performed a few experiments. Last year forty or fifty of the hundred and twenty in the department were applying plant foods, potting, watering, watching and recording their observations on corn, lawn grass, house plants, sweet potatoes, and other plants.

Our laboratory has no greenhouse facilities. We have ten windows in the three rooms (laboratory-classroom, stock-room, and office) of which only four are available for plants. Two of these have tiers of glass shelves to give additional space. These sound like poor conditions for handling so many experiments, and we no doubt could do better work with less limited facilities. In spite of that the experiments have been interesting and seemingly profitable.

As yet we do not have enough data to make conclusions about the general usefulness of the nutrient solutions prepared in the laboratory, nor of *Vigoro*, *Kcm*, $B_1$, nor other prepared soil fertilizers.

The disposal plant for the sewage of our town, like that of many others, accumulates the sludge in dried form. This is available, free, to farmers or townspeople. But as soon as they began to use it came the widespread complaint, "It burns the grass." If you could see the amount spread on some of the town lawns you would understand why "it burns."

At our invitation, one daily paper has twice published pictures of some of the plants raised in our laboratory in which

Mitchell Disposal Plant sludge was used. It was our attempt to say that, if properly used, this fertilizer aids the growth of some plants. Of course, the reporter wanted some definite statements: how much sludge to use per square foot of soil; how much the grass will grow in a week; whether it is equally good for wheat, oats, and cabbage. To the daily press the scientist often seems slow and annoyingly indefinite, because the scientist wants masses of information before drawing a conclusion. At least our plant experiments could show the interested public that there is material available which can improve the rate of growth, and, in some cases, the color of blossoms of certain plants (Fig. 1). What amount to use in any particular soil for any particular crop must be a matter of experiment with the individual farmer or gardener. To the biologist it is understandable that overfeeding of any crop will "burn" it, presumably by reversing osmotic flow.

Before we tried the disposal sludge as fertilizer we did numerous experiments (and still do) with nutrient solutions. Our first help was received from ELLIS AND SWANEY, *Soilless Growth of Plants* (Reinhold Publishing Company, 340 W. 42nd Avenue, New York City). The chemical formula we have used most often through the four years is from that source. It is as follows:

NUTRIENT SOLUTION

*Fertilizing Solution*

| | | |
|---|---|---|
| Monopotassium phosphate | 5.9 | grams |
| Calcium nitrate | 20.1 | " |
| Magnesium sulphate | 10.7 | " |
| Ammonium sulphate | 1.8 | " |

Dissolve each of the above chemicals in about 1 pint or 1 quart of distilled water. Then mix the dissolved salts and add enough distilled water to make 5 gallons.

To provide the necessary "trace elements" we now dissolve together in 1 pint of distilled water:

| | | |
|---|---|---|
| Boric acid crystals | 0.8 | gram |
| Manganese sulphate | 0.8 | " |
| Zinc sulphate | 0.8 | " |

To each 5 gallons of the *fertilizing solution* as prepared above we add 10 cc. (2 teaspoons) of the boron-manganese-zinc solution.

Because of its tendency to precipitate, the iron is kept in a separate solution. For this, dissolve 0.8 grams of ferrous sulphate (or ferric nitrate, or ferric chloride) in 1 pint of distilled water. Just before introducing to the plant add 5 cc. (1 teaspoon) of this iron solution to each quart of nutrient solution.

To get quick results we have used cuttings from house plants which root readily. With begonias and coleus cuttings the Ellis and Swaney nutrient solution gives spectacular results for growth (Fig. 2). Even with unrooted slips, within a week the student begins to note differences between the one with the experimental factor and the control, which we usually grow in city water rather than in distilled water. And Mitchell city water offers considerable food to a plant. Coleus in the city water often has brighter reds than does that in the nutrient solution. Begonias acquire a beautiful glossiness and bloom earlier with the added chemicals. The vine com-


FIG. 1. Growth in fertilized soil and in nutrient solution, 57 days.

A. Begonia, in soil, height, 6½ inches.
B. Begonia, in soil fertilized with sludge from sewage disposal plant, height, 11 inches.
C. Coleus, in distilled water, height, 4½ inches.
D. Coleus, in city water, height, 7½ inches.
E. Coleus, in nutrient solution (Ellis and Swaney), height, 9 inches.

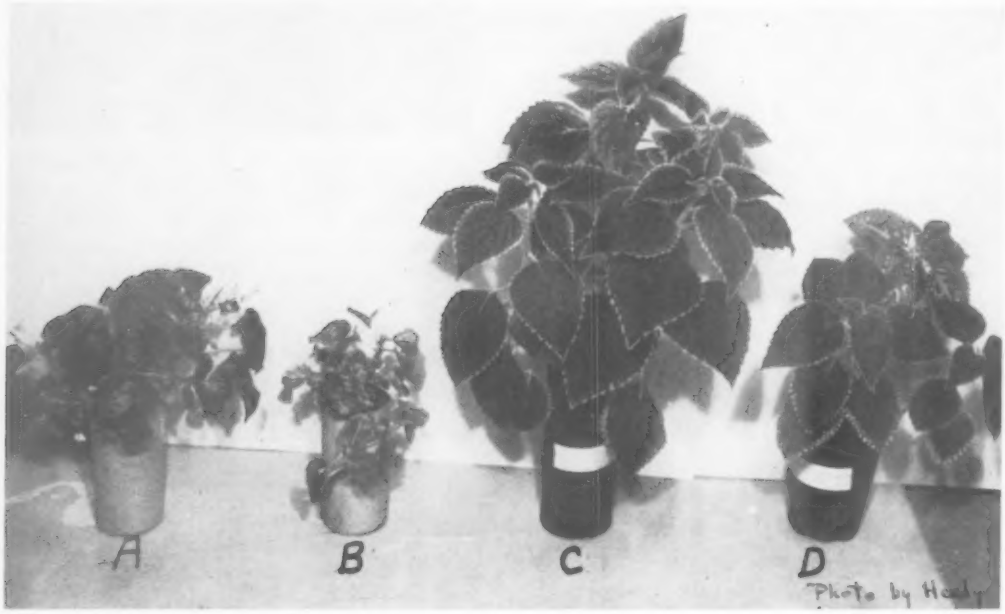


FIG. 2. Growth in nutrient solution and in city water, 42 days.
A. Begonia, in nutrient solution.
B. Begonia, in city water.
C. Coleus, in nutrient solution.
D. Coleus, in city water.

monly called Madera Vine makes amazing speed in growth in the nutrient solution. Sweet potatoes, and especially yams with their bright red stems, delight students as they respond readily to the Ellis and Swaney nutrients and to *Kem*, a commercial preparation.

There is another side to this exciting pastime. Geraniums just won't play at our game. Nothing, so far as we have observed, seems to help or hinder them. We have tried *Kem*, *Vigoro*, $B_1$, Mitchell Disposal sludge, and the Ellis and Swaney nutrient solution. Even angleworms, but that is another story. Narcissus bulbs seem to have what food they need stored within them. Our $B_1$ experiments with Paper White Narcissus bloomed slightly earlier than the controls in a few cases but not in all. Because we have not satisfactorily figured out the problem of supporting seedlings in a solution we have done very little with grains, grasses, and garden vegetables.

Several students have tried these seedlings with Mitchell Disposal Plant sludge, but, as each person brought different soil (usually from his home farm or garden) and has used his own choice of amount for a given measure of soil, we have not yet amassed enough data to make conclusions.

Usually each student had, besides his control (No. 1), two other pots of soil, each with fertilizer added. For example, No. 2 might contain 1 tbsp. pulverized fertilizer to 1 quart of soil, and No. 3 have 2 tbsp. fertilizer to 1 quart of soil. It is not necessary to remind scientists, though it is necessary to remind beginning students, that in a controlled experiment all other factors besides the experimental factors are identical. In this case the identical factors are: kind and size of pots, drainage, basic soil, number and kinds of seeds or plants in a pot, kind of water and amount of water supplied after the original set-up, and the amount of sunshine. With us, sunlight

(Continued on page 15)

# President's Page

THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS is now entering its seventh year of activity. Through faith, confidence, unity of purpose, outstanding programs, unselfish leaders, and the journal which meets teacher needs, the Association has grown and will continue to grow. Membership confidence is most important for the solidity and perpetuation of an organization.

We appreciate that world conditions disrupted the traditional programs of this organization and, thereby, handicapped its progress. Fortunately, the Association was able to have a regional meeting, July 4th, in Pittsburgh, and an annual meeting in Cleveland September 16, 1944. Quality, seriousness and unity of purpose, as well as sociability were paramount at this meeting, portraying the attitude and strength of the Association.

If biology is important then the teachers of biology must make it so. This can be done only by the trained and experienced instructors who realize the importance of the life sciences in practical everyday living. The National Association of Biology Teachers has made great strides in helping the teacher of biology to realize to the fullest extent his obligation both to the student and to the subject in present and future living.

Even though the Association is in the seventh year of its existence, we are still interested in increasing our membership, for two reasons: (1) teachers of biology can receive aids and invaluable experiences through membership in the National Association of Biology Teachers; (2) increased membership means increased funds for the organization of operations to protect and insure better teaching of biology. The addition of 300 paid members from September 1, '44 to September 22, '44 makes a total of 1,049 paid members for this year, and almost everyday new subscriptions are being received by the Secretary-Treasurer. Miss Knauz, chairman of the membership committee, has again used the *Turtox* mailing list to make contacts with new members. *Science News Service* mailed out to their members the privilege cards and enclosed the Cleveland Program to bring the National Association of Biology Teachers before its members. But in addition to these helps, the chairman has aroused further interest in membership by her excellent work with state chairmen who have cooperated with her to increase the state membership. I sincerely hope that each member will feel the importance of the obligation to secure at least one new member for the present year. Surely, out of some 30,000 teachers of biology, 3,000 will want to be members of the National Association of Biology Teachers.

The financial status of the Association is most encouraging, due to the combined efforts of Dr. Jeffers, Mr. Whitaker, Miss Knauz, Mr. Price, Dr. Breukelman, Mr. Russell, the 120 donors, and all other members. The goal to be "out of the red" in September is a reality.

I consider it a real honor and privilege to be the president of the National Association of Biology Teachers. The cooperation and support of the officers and members has made this organization a vital, essential, purposeful, growing Association with a future far more beneficial to the teachers of biology than the past has been because, we are now in a position, through this combined effort, actually to help, defend, and project practical, livable biology to the nation.

HELEN TROWBRIDGE

## THE SEVENTH YEAR

With this issue we begin the seventh volume of THE AMERICAN BIOLOGY TEACHER. A year ago, this column said: "We begin it [the sixth year] under the trying conditions of a total war, which has engulfed biology and biology teaching along with everything else. To keep the journal up to its past standard and to increase its usefulness in this critical period requires the help and cooperation of many people." This "help and cooperation of many people" has been forthcoming in full measure. Both the members of the staff, with its various committees, and the readers have increased their efforts for constructive improvement. The editors and committee chairman have not hesitated to "put the bee" on individuals they thought were in a position to give assistance; in every case the individuals came through with the help asked for, and in many cases they made further suggestions which turned out to be of benefit to the journal and its sponsoring organization. I now ask everyone concerned with the welfare of our entire setup to continue your good efforts.

I wish especially to give official recognition to "Jeff" for the fine job he did as Secretary-Treasurer. With the change in office location, the change in dues, the membership campaign, the irregularities growing out of the cancellation of the annual meeting as only a few of the difficulties, he carried an exceptionally heavy load. He was always right on time with his reports and he left the office and records in fine shape for his successor. A big orchid to George W. Jeffers.

The new Secretary-Treasurer, M. A. Russell, "Merl" to his friends, is well known to the organization and the journal. He has been an associate editor throughout the life of the journal, and has held office in the organization for three years. He is now the Immediate Past President. He is thoroughly acquainted with every phase of the work of both *The National Association of Biology Teachers* and THE AMERICAN BIOLOGY TEACHER. This is your official welcome to the "workingest" office in the organization, Merl, and also our pledge of continuous cooperation with you.

## PITTSBURGH REGIONAL MEETING

The regional meeting, sponsored by *The Biology Teachers' Club of Southwestern Pennsylvania*, was held July 4 and 5, with an excellent program and a satisfactory attendance. High spots of the program were as follows:

TUESDAY, JULY 4

*Presiding:*

DR. O. E. JENNINGS, *University of Pittsburgh*

*Workshop in Field Natural Science*—Dr. Dwight Sollberger, State Teachers College, Indiana, Pennsylvania

*Direction of Biology Teaching in Cleveland*—Vincent Peterson, Glenville High School, Cleveland, Ohio

*International Biology*—G. W. Jeffers, Farmville, Virginia*

*Workshop in Heredity*—Phyllis Cook Martin, Pennsylvania College for Women

Demonstration Illustrating the *Teaching of Biology in the Secondary Schools*—Peter Gray, University of Pittsburgh

Fifty Minute Sky Show, *By Rocket to the Moon*, at the Buhl Planetarium, under the direction of John Landis, Personal Relations Manager, and William McGary, General Manager.

WEDNESDAY, JULY 5

Field trips under the direction of Joseph Kradel and Alice Taylor.

Morning trip to Summer School, School and Estate Gardens, Highland Park Zoo.

Afternoon trip to Municipal Hospital Clinic, Cathedral of Learning, and Carnegie Museum.

The officers of the club are as follows:

*President*—Elizabeth McClelland

*First Vice-President*—Harry Wieand

*Second Vice-President*—Carsten Ahrens

*Treasurer*—Elmer Thumm

*Secretary*—Janette Dickson

* Some of this material will be presented in a later number of THE AMERICAN BIOLOGY TEACHER.

## TREASURER'S REPORT FOR JULY AND AUGUST

RECEIPTS

| | |
|---|---|
| Balance from Dr. Jeffers | $ 716.10 |
| Received from 44–45 members | 244.00 |
| " " 45–46 " | 7.50 |
| " " 46–47 " | 1.50 |
| Member contributions | 29.50 |
| Old accounts | 1.00 |
| Received from advertising | 358.17 |
| Total | $1357.51 |

EXPENDITURES

| | |
|---|---|
| *Science Press* for Feb. and Mar. '44 A.B.T. | $ 575.51 |
| Officer's expenses | 61.22 |
| Printing 2000 member postal cards and stationery | 66.89 |
| *General Biological Supply House*, for 16,000 postals | 160.00 |
| Cash balance | 494.15 |
| Total | $1357.77 |

Bills Payable

| | |
|---|---|
| *Science Press*, Apr. and May '44 A.B.T. | 608.05 |
| *Swift Print Shop*, for programs | 18.36 |
| *New Method Book Bindery Inc.*, for binding 3 Vols. A.B.T. for Library of Congress | 6.25 |
| Total | $ 632.66 |
| Subtracting the cash balance | 494.15 |
| Deficit | 138.51 |
| Total paid membership Sept. 1, 1944 | 749 |
| Total of 150 members extra contributions | $ 224.10 |

Your continued help in securing new members is much needed. As Dr. Jeffers stated in the May *American Biology Teacher* "If any member feels disposed to make his or her check a little bit bigger, the excess to be applied on the debt, it will be greatly appreciated."

## CANADIAN NATURE

Readers in Canada and the northern states will be especially interested in *Canadian Nature*, published five times during the school year by the Whittemore Publishing Company, 177 Jarvis Street, Toronto, Ontario. Each of the five issues contains about 36 pages, richly illustrated with drawings and photographs, some of the latter in color. The objective of the publication is to furnish authentic information about the natural phenomena of Canada, to develop intelligent interest in Nature and to stimulate first hand nature-observation on the part of teachers and pupils. The articles are of medium length, well illustrated and so written as to make good supplementary material to fill in what textbooks in biology cannot include. The Whittemore firm also publishes booklets on flowers, birds, etc., of Canada. Group rates exist for subscriptions to *Canadian Nature* and quantity prices for the booklets.

## BY THE WAY

WHEN COLLECTING FALL TWIGS for winter bud study, get a few extra to lay aside for use in the spring when the leaves are emerging. Cover with laquer or varnish to keep the buds, leaf scars, etc. in good condition.

INSECT GALLS can be collected in the fall. If the insects are still in them, place the galls in small jars covered with cheesecloth or glass plates and notice what type of insects emerge.

COLLECT BIRD NESTS in the fall; when the leaves have fallen from the trees the same nests that were so nearly invisible last spring and summer stand out boldly against the sky.

POLLEN GRAINS, SPORES, etc., may be mounted permanently by sprinkling them on slides that have been coated with clear fingernail polish. Allow to dry thoroughly and apply a cover glass in the usual way.

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(Continued from page 12)

is always a problem as we have so few windows and such crowded shelves.

Plants in solution should be grown in glass containers in order that the observer may note and record differences in root growth. Glass containers should be covered by a collar of dark paper to exclude sunlight, as algae grow abundantly in the nutrient solution. Both the jar and its collar should have identical labels, giving concise information, in case the collar be removed. All solutions, including water, should be emptied once a week, the plants laid out so the roots can air, then put back into fresh solutions. Each time the plants are given any care observations and care should be clearly recorded.

This article is presented with small concern for our conclusions, but with the hope that it may suggest exciting experiments which teach correct experimental procedure, and with the belief that here is an important tie-up between the school community and the home community.

# Culinary Herbs

A. E. HUTCHINS
University of Minnesota, University Farm, St. Paul

Culinary herbs, which had an important place in the gardens of our ancestors, are now receiving increased attention and popularity. Those who cannot find time to plant and care for a real herb garden can at least become familiar with and enjoy some of the more pleasing and attractive herbs by planting a few in the flower and vegetable garden.

From the standpoint of the practical gardener, herbs may be defined as those plants which, because of their aromatic and healing properties, are useful for medicinal, perfuming, or flavoring purposes and which, in some cases, may have a definite ornamental value as well. Thus herbs may be classified, according to their uses, as medicinal, culinary, aromatic, and ornamental. Some herbs may have two or more of these uses.

It is to be regretted that herbs do not play a more important part in American cookery, because their use opens the way to the preparation of an infinite number of distinctive and appetizing dishes. Herbs can make insipid dishes most appealing; can give a delightful cooling and stimulating flavor to drinks; can give a new and distinctive flavor to warmed-over dishes; and, in many other ways, can aid the housewife in banishing monotony from her menus.

Owing to their pungent distinctive flavors, herbs are used only in small quantities to lend flavor or aroma to the culinary product. One or two plants frequently will produce all the average family needs. Many of them are attractive in appearance and are not out of place in the flower garden.

Fortunately for the gardener, most herbs are easy to grow. Though they are able to take care of themselves and survive under adverse conditions, almost like weeds, they will be most attractive and give the best results if properly planted and cared for. Herbs do best in a sunny location. Partial shade may produce a more luxuriant growth, but lots of sunshine is needed to make most herbs rich in the volatile oils responsible for the odors and flavors. For this reason, a west, south, or southwest slope is preferable.

Any good garden soil will prove satisfactory for most herbs, although many of them seem to prefer a rather meager, poor soil. If the soil is too rich, their growth is often rank and the oils poor in quality. Only a few herbs, particularly those frequently cut, such as parsley, chives, and basil, require applications of manure or other plant foods. Water-loving herbs, such as the mints, cress, lovage, pennyroyal, and angelica, should have a fairly moist location. Most other herbs do best on a rather dry, well-drained soil.

The soil should be well prepared before planting. Loosening the soil to a depth of from 18 inches to 2 feet aids in deep penetration of the roots. However, if the herbs are planted in the vegetable garden, fair results can be obtained by the usual plowing. All clods should be well broken up. The surface should be very finely pulverized, especially if seeds are used instead of transplants.

Herbs require little attention after they have once become established. Cultivate only often enough to kill the weeds and provide a fine dust mulch. Except for the moisture-loving herbs mentioned above, watering is necessary

only in periods of fairly severe drouth. In general, herbs are remarkably free from insects and diseases. Only a few need fertilizing.

Tarragon, chives, pennyroyal, and the mints are always propagated by cuttings or divisions. Practically all the other herbs may be propagated from seed. It is usually well to sow early in flats or shallow boxes, transplant into pots or flats when the plants are small, and set in the garden as soon as out-door growing conditions are favorable. This also provides a longer growing season. Sow shallow in the flats and cover lightly with finely pulverized soil or sand. When herbs are seeded directly in the field, radishes are often sown along with them to mark the row until the herbs come up.

Most perennial herbs can be propagated by cuttings of the roots or tops. Top cuttings, a few inches long, usually root readily if placed in moist, shaded, light soil. As soon as they start growing, they may be transplanted to the garden. Plants may be taken up in the fall, kept in the house or greenhouse during the winter, and cuttings made early enough in the spring so that they will be well rooted and ready for setting in the garden as soon as conditions are favorable. To be most successful, hardy perennial herbs should be lifted and transplanted every 3 or 4 years. If this cannot de done, a top dressing of rich soil each fall will help keep them healthy and vigorous.

Such herbs as sage, thyme, and savory are often propagated by means of layers. Selected branches, still connected with the plant, are laid on the ground, pegged down, and the joints covered with an inch of dirt. Under favorable growing conditions, roots will be formed in 3 or 4 weeks. Then the layered branches may be severed from the plant and planted whole or cut into as many pieces as there are rooted joints.

Mints may be divided by thrusting a sharp spade through the clump and transplanting the divided parts. Other perennial herbs may be divided in the same manner, but the plants receive a severe check and are apt to be unsymmetrical. Chives are divided by pulling the plants apart from the clump and planting them individually. In garlic, the cloves into which the bulbs are divided are planted.

In regions having severe winters, it is usually necessary to give the perennial and biennial herbs a winter covering of some material such as straw, marsh hay, or leaves.

At least a few herbs should be available for winter use. Most herbs are fairly easy to store and will retain their aroma or flavor for a considerable period of time. Some kinds may be potted for winter and grown as house plants.

Foliage harvested for storage should be cut on a bright, dry day when the plants are in full growth, vigorous, and full of sap, and just before flowering. They should be cut close to the ground, tied in bunches, labeled, and hung up to dry in a cool, clean, dry, dustless, airy room, such as an attic, and dried as quickly as possible. If desired, the leaves may be stripped off and dried in trays. When dry enough to crumble, the leaves, whole or finely crumbled, may be placed in widemouthed bottles or fruit jars, labeled and tightly corked or covered. Look at the jars daily for a few days and if any moisture is present, remove the herbs and dry further. Herbs must be thoroughly dry to keep well. Sweet basil, hoarhound, marjoram, sage, thyme, balm, savory, tarragon, lavender, parsley, celery, dill, fennel, and mint are the herbs whose foliage is most commonly dried.

Herbs grown for seed should be allowed to ripen and then harvested just before the seed starts dropping. Place the seeds with other attached parts on a paper or cloth to dry. As soon as they are dry enough, thresh them out and remove the dirt and refuse. Then spread the clean seeds in thin layers on a cloth or paper until they are thoroughly cured. Store in glass jars. The conditions for harvesting, curing, and storing should be the same as those necessary for preserving the foliage. Among the herbs whose seeds are commonly used are angelica, anise, celery, sweet cicely, coriander, cumin, dill, fennel, lovage, poppy (maw), and sesame (bene).

Herbs that may be taken up in the fall, potted, and used as house plants include bush basil, chives, pot marigold, sweet annual marjoram, mints, parsley, rose geranium, rosemary, and lemon verbena.

Most of the herbs mentioned can be obtained from leading seed companies. For some of the less common ones, the gardener may have to shop around considerably to obtain them.

To the herb lover and to those who may become interested in additional herb lore and desire to pursue the knowledge of herbs to a greater extent, the following partial list of publications may be of value:

*Herbs—Their Culture and Use.* CHARLOTTE P. BROOKS AND ABBIE GRAHAM, Vermont Agricultural Extension Circular 83. 1935.

*The Herb Garden.* G. P. VANESELTINE, New York (Geneva) Agricultural Extension Circular 157. 1935.

*Herbs in Cooking.* GRACE TABOR, Editor, Garden Department, Woman's Home Companion. (A Woman's Home Companion Booklet.)

*Savory or Aromatic Herbs in the Kitchen Garden.* W. R. BEATTIE, SR., Horticulturist, Bureau of Plant Industry, United States Department of Agriculture.

*Culinary Herbs.* University of Minnesota, Agricultural Extension Circular 54. 1936.

# A Simple Motor-pattern Test

GERTRUDE S. EVANS
William Waldo Blackman Laboratory, The New York Medical College

Three minutes in a biology classroom is enough to administer a simple student motor-pattern test.

Distribute sheets of paper with a line ruled down the middle, one column marked for right-hand work and the other for left. As the student makes the design called for, he places a dot over the end point. This gives the direction of the drawing. The design should be left slightly open at the end; this slight break emphasizes the direction of line, for the study of the tests.

Pencil in the dominant hand, the student draws a straight line to the right and places a dot over the end; he then draws a straight line to the left (under the first line) and adds the final dot. With his pencil in his other hand, he draws first the straight line to the right, followed by the straight line to the left. This is the beginning of the test, in which he is instructed to make in succession, one under the other, a *circle*, *triangle*, *figure-of-eight*, *square*, and *watch-spring spiral*. Do not illustrate on the blackboard, as this is suggestive and influences the test. The student first uses the dominant hand, completing the five designs in one column. He then repeats the five designs *with the other hand*, in the *other column*. The pencil is not to be lifted from the paper while drawing the design, which must not be retouched.

### Analysis

In studying the results one notes that the designs are either clockwise or counterclockwise; why the student selects the direction he does is of interest, and suggests certain associations of motor patterns.

Having made the circle in one direction, the other designs may follow the same direction, showing *routine* effort. This may produce the best results if the student relies on experience and training. It may indicate his action complex in other occupations or processes. Or, we may find the student interferes, or experiments as he draws, changing direction of rotation. This may produce better or worse results, for various reasons too lengthy to detail here, but noticeable.

Having found from the work of the dominant hand whether the student's performance is to be classed as *routine*, *experimental*, *careless*, or *excellent*, compare the second five designs, one by one. If the circle is drawn in the same direction of rotation, it is a copy pattern; if in the reverse direction, it is a mirror pattern. If all are copy patterns or all mirror patterns, it is an interesting light on the motor activity of the individual. A straight copy pattern differs from a straight mirror pattern in the action of the brain, presumably selected for best results. (In breast-stroke swimming, the two arms move in mirror patterns.)

The circle and the letter "O" are associated in the minds of those who write. In testing defense workers as a group, and college students as a group, a difference in direction of rotation was noted. The college students to a high percentage rotated the circle counterclockwise; the defense workers did not. It is a question whether people write as they draw or draw as they write, by association.

In analysis, notice at what point in the design it is started and ended (top or bottom, left or right) and whether the spiral begins in the center or on the outside. Study direction and firmness of line, proportion and size variation. Observe gradual improvement or deterioration, abrupt changes in rotation or size. Percentages can be taken in a group, and these compared with another group.

This test is an attempt to analyze the control of movements by brain centers. We may wonder whether we can improve this control, which is supposed to come from the dominant side of the brain. We might try exercises in the movements of this test by using both hands simultaneously for a short time each day. By means of simultaneous "mirror" and "copy" writing, respectively, we introduce different controls. This is not essentially different from swimming or learning to play the piano. Movements of a separate discriminative nature are considered cortical. Regular, rhythmic movements (walking, swimming, flying) become transferred, so far as direct control is concerned, to the cerebellum. But complicated movements acquire character through the basal ganglia of the cerebrum. Here the thalamus is a great sensor reception center, and the striate body a motor center, where muscle movements are regulated in very individual patterns, and combined, so that once acquired they are resistant to modification.

Robert Livingston Johnson, president of Temple University, has announced that *The Rockefeller Foundation* has granted the university's biology department $6,200 to carry on immunologic work for the next two years. The research will be directed by James A. Harrison, Professor of Biology.

Secretary-Treasurer Russell announces that the *November* issue will be the last one sent to those who have not renewed their membership.

# Gadgets

Many a boy who happens to be "mechanically minded" or handy with tools can help the biology teacher by making various useful articles. In most cases it it only necessary to suggest that such-and-such a "gadget" would be a valuable addition, and the boy will volunteer to make one. Here are three such laboratory aids made by tenth-grade pupils.

### Microscope Lamp

Any boy who has done metal-working

Fig. 1. A "home-made" microscope illuminator.

in a shop course can make up a microscope lamp similar to the one in figure 1. Merely fasten a lamp socket in the cover of a large can and solder a small can at an angle over a hole in the side of the larger can. A 60-watt bulb will furnish enough light shining down through the smaller can to the sub-stage mirror so that a student microscope can be used on dark days or at night.

### Bottle Stand

A handy rack or stand for bottles of stain, dropper bottles and the like can

Fig. 2. A bottle rack for keeping staining solutions together.

be constructed from odds and ends of $3 \times 4$'s and $3 \times 8$'s. One $3 \times 4$ is glued to a $3 \times 8$. Using an expansion bit, holes of various diameters and depths can be bored to accommodate the bottles. See figure 2. This one has holes 2 inches in diameter along the top row and $1\frac{1}{2}$ inches in diameter in the lower row. The rack can be sanded and varnished for better appearance.

### Test-tube Aquaria

Test-tube aquaria are interesting for

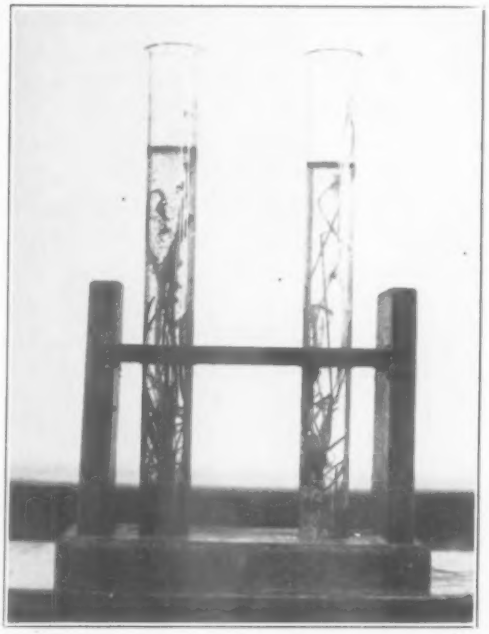

Fig. 3. Biology pupils made several of these racks for holding test-tube aquaria.

close study of algae, small water animals, and plants. Use the large tubes having a diameter of about one inch and a length of from eight to ten inches. Placed in home-made racks on the window-sill, they will provide many instructive minutes when examined with a hand lens. The rack shown in the photo (Fig. 3) is one of a dozen made up by three biology pupils who were taking a shop course in wood-working.

DONALD S. LACROIX,
*Amherst High School,*
*Amherst, Massachusetts*

## BY THE WAY

A PROTOZOAN INFUSION may be started at any time—merely put a handful of dry grass or leaves in a quart jar and cover with water; place it where the light is good (not very much direct sunlight) and observe from day to day to see what kinds of microorganisms are present.

SEED COLLECTIONS can be made in the fall. Have the pupils collect as many different kinds of seeds as they can, both native and cultivated. Classify the seeds according to habitat, type of dispersal, economic importance, and the like. Some of the "seeds" are actually *fruits;* this adds an interesting phase to the study.

## RUTGERS UNIVERSITY RESEARCH COUNCIL

Rutgers University has announced the creation of a Research Council to promote research in all departments. A survey is now being made of personnel and facilities to determine where new funds for research can best be invested. Representing the biological sciences are Dr. Walter C. Russell, Professor of Agricultural Biochemistry in the College of Agriculture, and Dr. William H. Cole, Professor of Physiology and Biochemistry in the College of Arts and Sciences. Dr. Cole, Director of the Council, will serve in a staff relationship to deans, department heads and faculty members concerning research programs, and will represent the university in developing reciprocal arrangements with governmental, industrial, business and professional institutions outside of the university.

A special research fund has been placed at the disposal of the Council, and applications for grants for next year are now being considered. Projects in biology will be emphasized especially as they may be related to any aspect of the war and of postwar development. Studies on the physiological value of proteins, being conducted by the Bureau of Biological Research, will be extended.



## SPECIAL ISSUES

The Special Issues, which were started in Volume 4, have met with widespread approval and the series will be continued. Eleven have been published to date, as follows:

Field Trips—October 1941
Visual Aids—November 1941
Nature Study—February 1942
Biology Clubs—March 1942
National Defense—April 1942
Consumer Biology—October 1942
Health and Hygiene—November 1942
Conservation—January 1943
Vocational Biology—April 1943
Ornithology—January 1944
Gardens—February 1944

Other Special Issues now planned are *Photography,* with Richard F. Trump,* Ames Senior High School, Ames, Iowa, as

chairman, and *Genetics*, with former Editor-in-Chief E. C. Colin, Chicago Teachers College, Chicago, Illinois, as chairman. The Photography Issue will appear in November; the date for the Genetics Issue has not yet been set.

Some consideration has been given to issues in *Laboratory Aids and Substitutes* and *Applied Biology*, but no chairmen have been selected nor are there any definite plans.

The Conservation Series, started last year, as a modification of the Special Issues idea will probably also be continued, under the leadership of Dr. E. Laurence Palmer; definite units or time schedules are not yet ready for announcement.

There have been a number of requests for "second installments" of certain Special Issues, especially Visual Aids and Nature Study.

## AMERICAN EDUCATION WEEK

*Education for New Tasks* is the theme for the twenty-fourth annual observance of American Education Week, November 5–11, 1944.

The United States is engaged in the greatest war in history. Before us loom the tasks of the postwar years which only an educated citizenry can hope to master. Such times require a great public school system, excelling by far anything that we have yet accomplished in the education of our children, youth, and adults.

Education has made and is making an indispensable contribution to the winning of the war. Its role in the peace will be equally significant if the American people understand its potential power.

We spare no expense to get people ready to win a war. Why? Because we know that only a trained people can win. Shall we do less to help our young people win the battles of the peace to come? American Education Week is an opportunity to interpret the role of education in the postwar years as well as the present contribution of the schools to the war effort.

The NEA has prepared materials to assist local schools in the observance of American Education Week such as a poster, leaflets, a sticker, a manual, plays, a movie trailer, radio scripts, newspaper advertising mats, and other materials. Address the *National Education Association*, 1201 Sixteenth Street, N. W., Washington 6, D. C., for an order form and further information.

* Chairman Trump is now in the United States Navy; his address at the time of going to press is Lt. (jg) Richard F. Trump, 432 Brown Hall, Section 125, Naval Training School, Princeton, New Jersey.

*Spencer GK Delineascope used by an Air Force Technical Training Corps, University of Ch*

# Seeing and Learning *Quickly*

In the first 28 months of its existence since March 1941, the Army Air Force Technical Training Command turned out more than 500,000 ground and combat crew technicians. An amazing total contrasted with the record of the preceding 20 *years* during which the Army Air Corps had graduated only 14,803 such technicians.

One factor which is helping to instruct such unprecedented numbers in so short a period is the use of visual methods. Spencer Delineascopes are in daily service in this vital work.

ARMY E NAVY

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